Forage Potential of Legumes Native to Sub-Tropical Southeastern USA

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Forage potential of legumes native to sub-tropical southeastern USA

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Introduction The subtropical part of the southeastern USA is one of the most difficult areas of the world for forage development . Climatic conditions range from tropical summer temperatures with high humidity to short periods of sub-freezing winter temperatures . Many forage legumes adapted to more temperate area have been evaluated for use in this region , but fail due to lack of summer persistence and successful pasture applications have been very limited . Likewise forage legume species from more tropical areas of South America and SE Asia often experience winter-kill and have found limited use . Additionally , root-knot nematodes (*Meloidogyne* spp .) (RKN) may dramatically limit legume persistence in lighter textured soils of this region . Research with the seven *Trifolium* spp . native to this region (*T . bejariense* Moric . , *T . calcaricum* J . L . Collins & Wieboldt , *T . carloinianum* Michx . , *T . polymorphum* Poir . , *T . reflexum* L . , *T . stoloniferum* Muhl . ex Eaton , and *T . virginicum* Small) , has shown that they generally have higher levels of RKN tolerance than introduced *Trifolium* species (Quesenberry , et al . , 1997) . We hypothesize that evaluation of legume species native to the region and similar subtropical climatic zones will identify species with higher success potential .

Materials and methods One accession each of *Centrosema virginianum* (L .) Benth , *Chamaecrista nictitans* (L .) Moench , *Crotalaria rotundifolia* J . F . Gmel . , *Desmodium incanum* DC , *Desmodium lineatum* DC , *Desmodium paniculatum* (L .) DC , *Galactia regularis* (L .) Britton et al . , *Indigofera spicata* Forssk , *Tephrosia spicata* (Walter) Torr . & A . Gray and *Trifolium carolinianum* Michx . was evaluated for field performance and response to RKN . All germplasm was collected from native stands in the vicinity of Gainesville , FL , USA . Field evaluations consisted of spaced plants transplanted into herbicide suppressed bahiagrass (*Paspalum notatum* Flugge) sod . Multiple accessions of *D . incanum* obtained from the USDA NPGS were evaluated in the field . Evaluation of RKN response was conducted using previously published (Quesenberry et al , 1997) methods for greenhouse screening . Legumes were evaluated for response to *Meloidogyne arenaria* race 1 , *M . incognita* race 4 , or *M . javanica* . Additionally legumes were evaluated for tannin levels of field grown forage in both Florida and Puerto Rico .

Results There were differences ($P<0.05$) among legume species for root gall and egg mass scores in response to each of the three RKN species . In general , the level of root galling and egg mass production was lower than that observed on introduced forage legumes in previous research (Kouame et al . , 1987) , although the accessions of *C . nictitans* , *D . lineatum* , and *T . spicata* would be classified as moderately to highly susceptible (root gall scores $\geqslant 3.0$) to all three nematodes . *Desmodium incanum* showed a near immune response to all three RKN species with no gall or egg masses observed . Similar to previously reported results *T . carolinianum* (the only clover species native to this region) showed highly resistant responses to these RKN species .

Field evaluations showed superior persistence for *D . incanum* which spread readily into an established bahiagrass sod . Although there was variability among accessions for productivity , this species in general showed good persistence over three years in the grass sod . However , a later planting of selected accessions in a bare soil became infected with an unidentified potyvirus and did not persist . Testing was conducted for BYMV , SMV and WMV , but not BCMV or DMV . *Centrosema virginiana* also showed good persistence in bahiagrass sod .

Tannin levels varied among accessions of *D . incanum* and among the other species evaluated . Measured levels were similar to accessions of *D . heterocarpon* that have been reported by other researchers under tropical conditions . The species of *Centrosema* , *Tephrosia* , *Galactia* , *Crotelaria* , and *Lotononis* showed lower levels of tannins than the *Desmodium* species .

Conclusions Domestication of plant species for cultivated agriculture has occurred over many centuries . Identification of legume native to a region may identify species having general ecologically adaptive traits and specific resistances to pest prevalent in the region . This research showed that legumes native to the SE USA in general did have high levels of RKN resistance and some of them were persistent when grown in a bahiagrass sod . However , other pest such as plant viruses may limit their usefulness . One must also be aware of factors such as tannins that may be associated with pest resistance , but may have an anti-quality attribute in forage-livestock systems .

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